

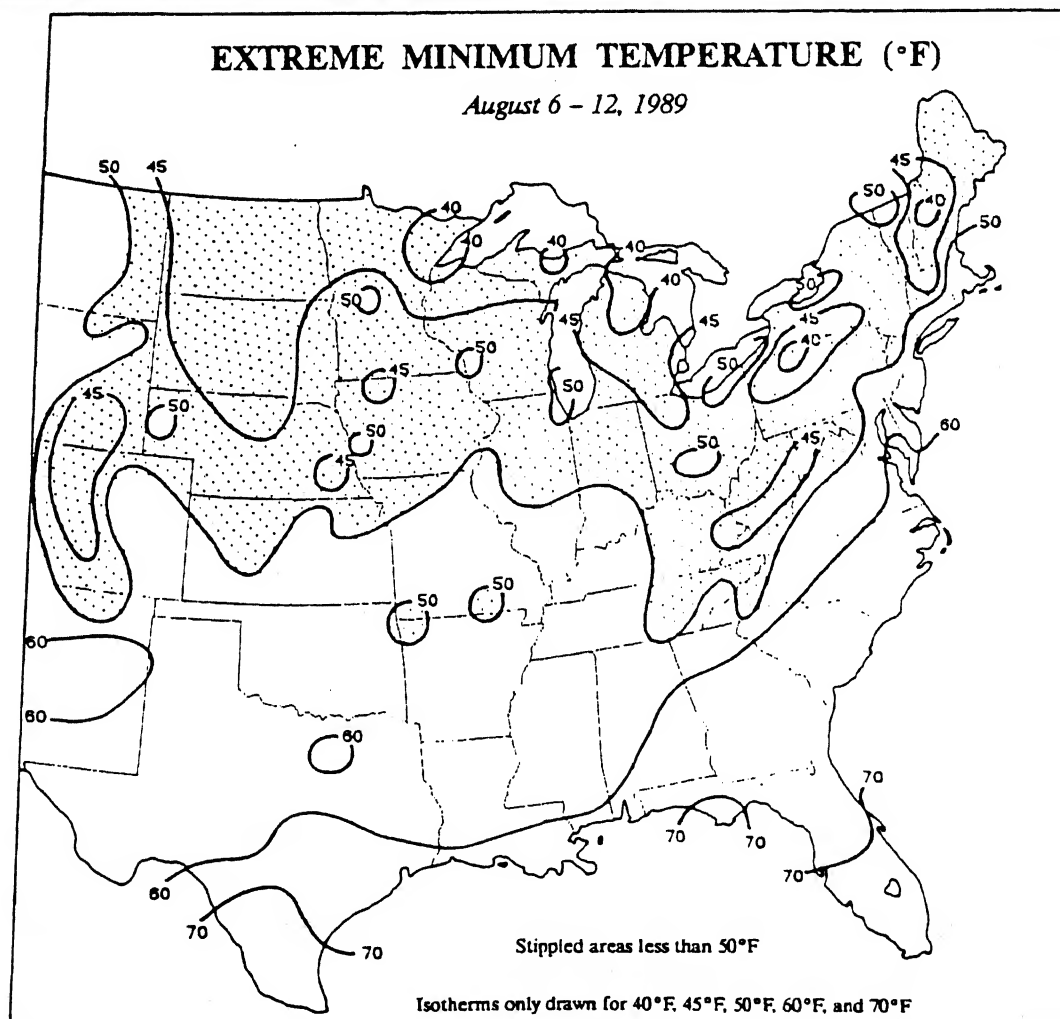
CONTAINS:
UPDATES
ON INDIAN
MONSOON
AND AFRICAN
SAHEL RAINY
SEASONS

WEEKLY CLIMATE BULLETIN

No. 89/32

Washington, DC

August 12, 1989



A STRONG CANADIAN HIGH PRESSURE CENTER BROUGHT UNSEASONABLY COLD AIR AND READINGS MORE TYPICAL OF EARLY OCTOBER TO MUCH OF THE EASTERN HALF OF THE NATION AS OVER 240 DAILY MINIMUM TEMPERATURE RECORDS WERE TIED OR BROKEN DURING THE PAST WEEK.

UNITED STATES DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL WEATHER SERVICE - NATIONAL METEOROLOGICAL CENTER

WEEKLY CLIMATE BULLETIN

This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

- Highlights of major climatic events and anomalies.
- U.S. climatic conditions for the previous week.
- U.S. apparent temperatures (summer) or wind chill (winter).
- U.S. cooling degree days (summer) or heating degree days (winter).
- Global two-week temperature anomalies.
- Global four-week precipitation anomalies.
- Global monthly temperature and precipitation anomalies.
- Global three-month precipitation anomalies (once a month).
- Global twelve-month precipitation anomalies (every three months).
- Global three-month temperature anomalies for winter and summer seasons.
- Special climate summaries, explanations, etc. (as appropriate).

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Climate Analysis Center via the Global Telecommunications System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

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GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF AUGUST 12, 1989

1. Southern California and Western Arizona:

TORRENTIAL DOWNPOURS OCCUR

Widely scattered thunderstorms dumped more than 300 mm of rain on portions of the normally arid Southwest, causing severe flooding (see U.S. Weekly Climate Highlights) [Episodic Event].

2. Southern and Eastern United States:

EARLY AUGUST COOL SPELL

Record-breaking low temperatures, as much as 7°C below normal, occurred across the southern and eastern United States (see U.S. Weekly Climate Highlights) [Episodic Event].

3. Caribbean Islands:

STILL DRY

Generally less than 24 mm of rain reported on many Caribbean Islands as a lack of tropical convective activity continued [9 weeks].

4. United Kingdom:

DRY WEATHER CONTINUES

Little or no precipitation fell in England as dry conditions persisted [6 weeks].

5. Western Europe:

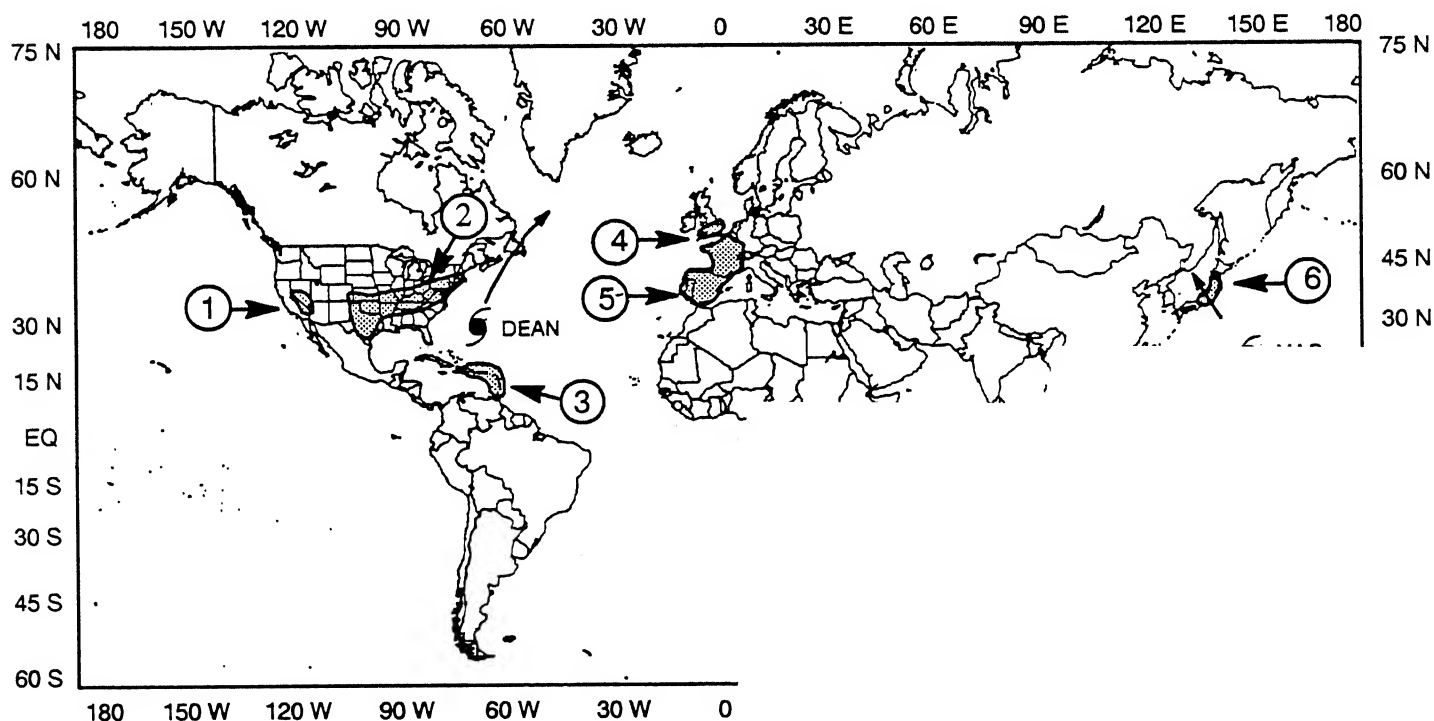
MORE WARM WEATHER

Unseasonably high temperatures, as much as 3°C above normal, remained in Portugal, Spain, and France [5 weeks].

6. Japan:

MORE HEAVY RAINS REPORTED

Inundating rain from Tropical Storm Mac dropped up to 190 mm of precipitation on Honshu Island of Japan last week and caused widespread flooding [2 weeks].



EXPLAN.

TEXT: Approximate duration of anomalies is in brackets. Precipitation

MAP: Approximate locations of major anomalies and episodic event temperature anomalies, four week precipitation anomalies, long-term

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF AUGUST 6 THROUGH AUGUST 12, 1989.

Atypical weather for early August prevailed in the Southwest and throughout the eastern half of the nation last week. Moist, unstable air from the Gulf of California triggered scattered thunderstorms that produced torrential downpours and severe flooding across portions of the normally arid desert Southwest. Farther east, record or near-record low temperatures in association with an unseasonably strong Canadian high pressure center chilled much of the Midwest, South, and East. The center of Hurricane Dean passed just to the west of Bermuda on Sunday, lashing the island with heavy rain and winds gusting up to 113 mph. As the storm rapidly accelerated to the northeast and slowly weakened, it passed over Sable Island off the coast of Nova Scotia early Tuesday and then hit southeastern Newfoundland later in the day. Early in the week, severe weather struck sections of New England, the Tennessee Valley, and the south-central Great Plains as intense thunderstorms developed in the moist, unstable air preceding a strong cold front. By late Monday, the cold front had rapidly moved off the New England coast but had stalled along the Gulf and southern Atlantic Coasts. Behind the cold front, dozens of stations in the Midwest tied or set new minimum temperature records. By mid-week, waves of low pressure developed along a stationary front, triggering scattered heavy showers and thunderstorms across southern Louisiana, central Florida, and southern Georgia. High pressure in the nation's midsection kept much of the East and Southeast relatively dry and extremely cool. In the West, monsoonal showers inundated parts of the desert Southwest and Great Basin as Yuma, AZ received over 3.5 inches of rain Wednesday evening, easily surpassing their normal ANNUAL total of 2.65

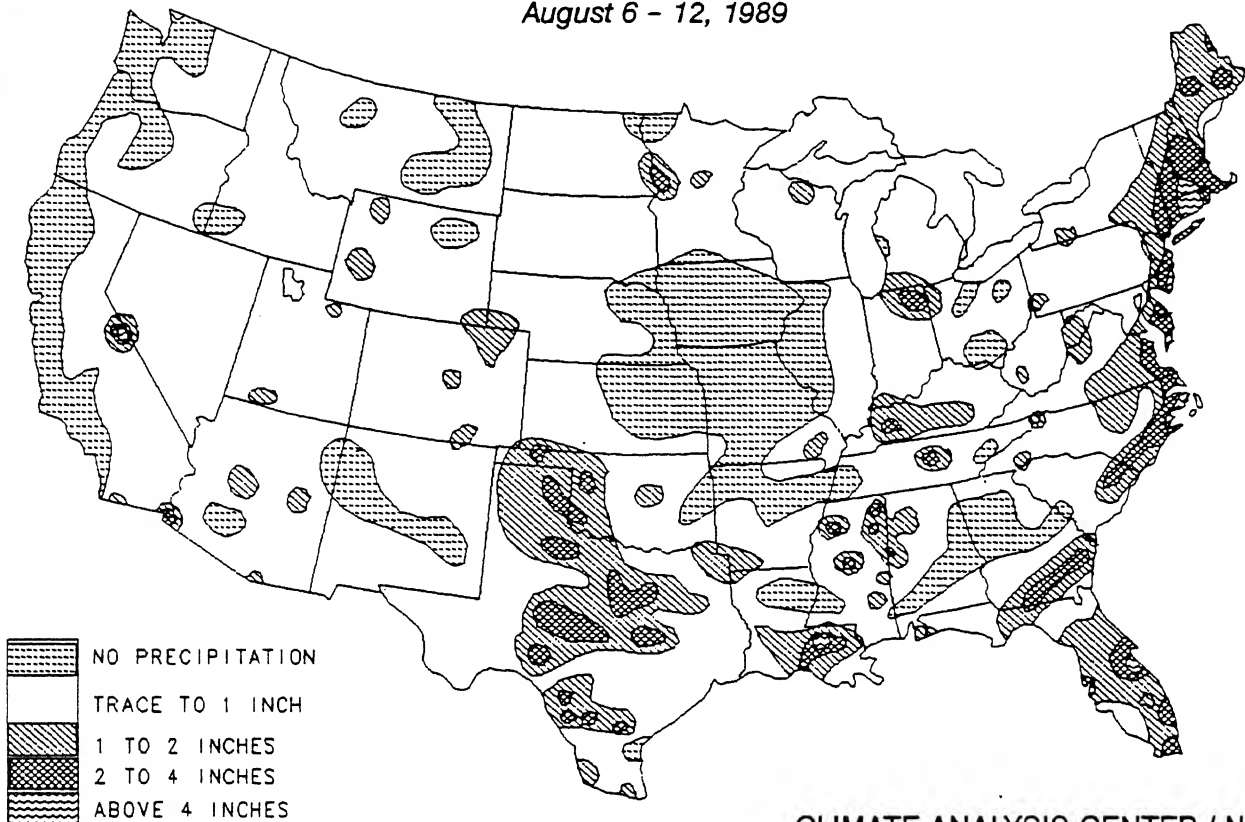
An upper-level disturbance touched off scattered thunderstorms in parts of the northern Great Plains, and upper Mississippi Valley. By the end of the week, a low pressure center

Island, NY (see Figure 1). Between 4 and 6 inches of rain were measured at many stations in Connecticut, Massachusetts, and Rhode Island, while up to 10 inches fell on the eastern section of Long Island, NY (see Table 1). Farther south, 2 to 4 inches of rain were reported along the Atlantic Coast from Cape Hatteras, NC northward to New York City. Widely-scattered showers and thunderstorms dumped between 2 and 3 inches of rain on parts of the south-central Great Plains and along the eastern Gulf and southern Atlantic Coasts. In addition to Yuma, AZ, isolated monsoonal showers drenched the normally arid town of Dyer, NV (east of Bishop, CA) with 4 inches of rain in 3 hours, while nearby Benton, CA received nearly a foot during the week. Light to moderate totals were observed across most of the Intermountain West and the Rockies, in the north-central and southern Great Plains, the Tennessee and upper Mississippi Valleys, and along much of the Gulf and Atlantic Coasts. Little or no precipitation fell along the West Coast, on the upper Missouri and middle Mississippi Valleys, in parts of the Southeast, and throughout most of the Great Lakes region.

Above normal weekly temperatures were confined to the northwestern quarter of the country, extreme southern Florida, and across most of Alaska. The greatest positive departures (between +5°F and +15°F) were recorded in northern and central Alaska, the northern Rockies, and the upper Missouri Valley (see Table 2). Before cooler air moved in, several locations along the eastern Gulf and southern Atlantic Coasts established new daily maximum temperature records early in the week as highs approached 100°F. In contrast, temperatures more typical of early October than early August chilled much of the U.S. east of the Rockies. Lows dipped into the upper thirties in northern Minnesota, Michigan, and in higher elevations of West Virginia while readings in the forties were common across the northern Great Plains, the Midwest, Great Lakes, and the Northeast (see front cover). Even areas along the normally muggy and warm Gulf Coast reported lows near 60°F. On Thursday, the mercury at Phoenix, AZ finally failed to rise above 100°F, snapping a stretch of 64 days with triple-digit readings. Over 240 daily minimum temperature records were tied or broken at various locations in the eastern half of the country during the week. The greatest negative departures (between -10°F and -13°F) occurred in the south-central Great Plains and lower Mississippi Valley (see Table 3).

OBSERVED PRECIPITATION

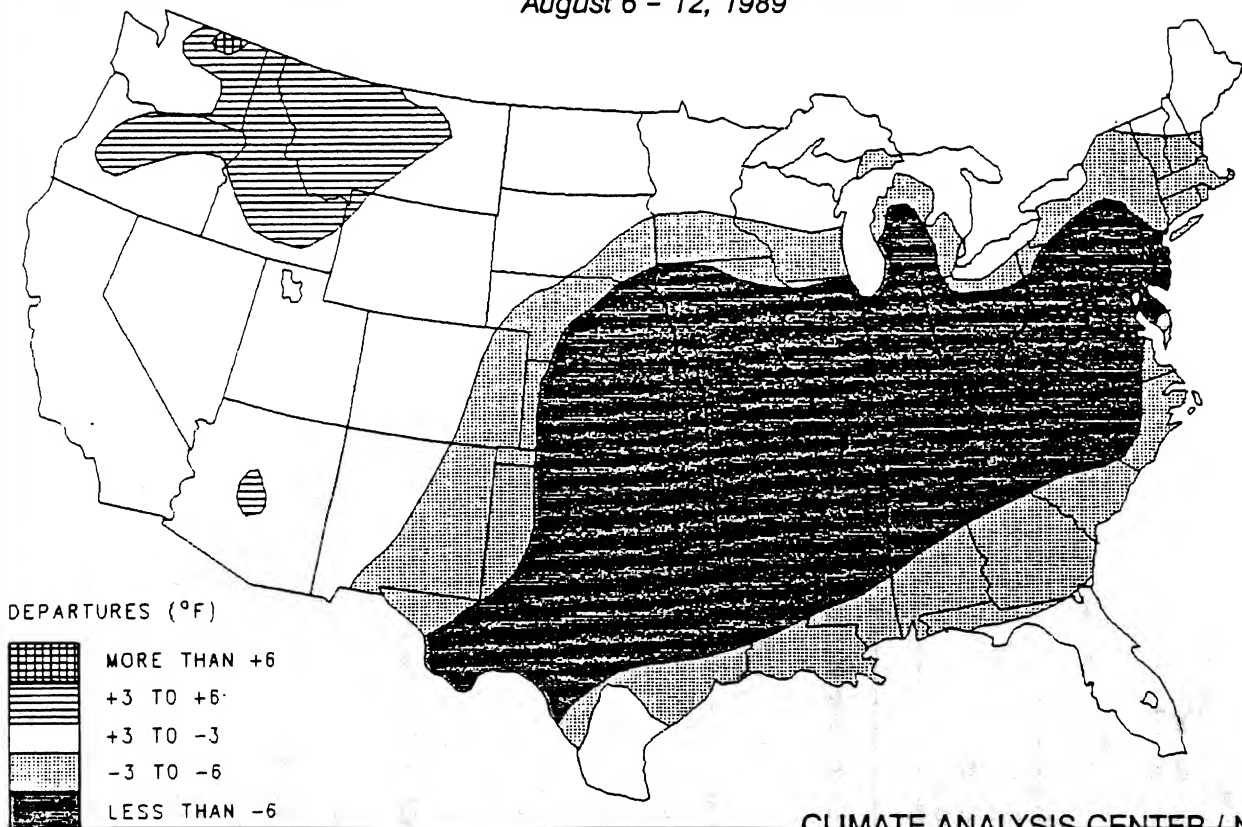
August 6 - 12, 1989



CLIMATE ANALYSIS CENTER / NOAA

DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)

August 6 - 12, 1989



CLIMATE ANALYSIS CENTER / NOAA

TABLE 1. Selected stations with 2.50 or more inches of precipitation.

| STATION | TOTAL (INCHES) | STATION | TOTAL (INCHES) |
|----------------------------|-------------------|-------------------------------|-------------------|
| MELBOURNE, FL | 8.22 | YUMA, AZ | 3.44 |
| NEW YORKLA GUARDIA, NY | 5.65 | VIRGINIA BEACH/OCEANA NAS, VA | 3.29 |
| CAPE HATTERAS, NC | 5.43 | NEW YORKKENNEDY, NY | 3.27 |
| CHICOPEE/WESTOVER AFB, MA | 4.94 | SOUTH WEYMOUTH, MA | 3.26 |
| HARTFORD, CT | 4.86 | PROVIDENCE, RI | 3.25 |
| ATLANTIC CITY, NJ | 4.56 | HOMESTEAD AFB, FL | 2.93 |
| NEWPORT NEWS/HENRY NDB, VA | 4.48 | BRIDGEPORT, CT | 2.88 |
| ISLIP, NY | 4.23 | PHILADELPHIA, PA | 2.88 |
| VALDOSTA/MOODY AFB, GA | 4.19 | WEST PALM BEACH, FL | 2.69 |
| NORFOLK, VA | 4.01 | SAN ANGELO, TX | 2.63 |
| NEWARK, NJ | 3.76 | MILLVILLE, NJ | 2.62 |
| SALISBURY, MD | 3.52 | WORCESTER, MA | 2.50 |
| ORLANDO, FL | 3.51 | FORT WORTH/CARSWELL AFB, TX | |

TABLE 2. Selected stations with temperatures averaging 4.0°F or more ABOVE normal for the week.

| STATION | DEPARTURE (°F) | AVERAGE (°F) | STATION | DEPARTURE (°F) | AVERAGE (°F) |
|----------------------------|-------------------|-----------------|-------------------|-------------------|-----------------|
| BARROW, AK | +15.6 | 54.4 | BIG DELTA, AK | +5.0 | 62.7 |
| FAIRBANKS, AK | +7.2 | 65.6 | KING SALMON, AK | +5.0 | 59.9 |
| HOMER, AK | +6.9 | 60.3 | HELENA, MT | +4.9 | 72.5 |
| NORTHWAY, AK | +6.6 | 62.3 | BOZEMAN, MT | +4.9 | 71.0 |
| VICTORVILLE/GEORGE AFB, CA | +6.4 | 84.6 | BARTER ISLAND, AK | +4.8 | 44.8 |
| LEWISTON, ID | +6.1 | 79.8 | FRESNO, CA | +4.7 | 84.4 |
| BOISE, ID | +5.5 | 79.1 | MCGRATH, AK | +4.5 | 60.4 |
| BURLEY, ID | +5.4 | 74.9 | ANCHORAGE, AK | +4.4 | 61.8 |
| MISSOULA, MT | +5.1 | 72.1 | PHOENIX, AZ | +4.1 | 95.0 |
| KALISPELL, MT | +5.1 | 70.1 | JUNEAU, AK | +4.1 | 59.7 |

TABLE 3. Selected stations with temperatures averaging 9.0°F or more BELOW normal for the week.

| STATION | DEPARTURE (°F) | AVERAGE (°F) | STATION | DEPARTURE (°F) | AVERAGE (°F) |
|-----------------------------|-------------------|-----------------|---------------------------|-------------------|-----------------|
| ENID/VANCE AFB, OK | -12.9 | 70.4 | TULSA, OK | -9.9 | 73.0 |
| HOBART, OK | -12.3 | 71.0 | WACO, TX | -9.8 | 76.7 |
| WICHITA FALLS, TX | -11.9 | 73.3 | HARRISON, AR | -9.5 | 69.0 |
| OKLAHOMA CITY, OK | -11.9 | 70.4 | WEST PLAINS, MO | -9.4 | 68.0 |
| FT. SILL/HENRY POST AAF, OK | -11.9 | 72.2 | GARDEN CITY, KS | -9.4 | 69.9 |
| MCALISTER, OK | -11.2 | 71.7 | CHANUTE, KS | -9.4 | 70.3 |
| DALLAS/FORT WORTH, TX | -11.1 | 74.8 | ABILENE, TX | -9.4 | 74.8 |
| TOPEKA, KS | -10.7 | 67.6 | FAYETTEVILLE, AR | -9.3 | 68.5 |
| GAGE, OK | -10.7 | 70.7 | COLUMBIA, MO | -9.2 | 68.6 |
| WICHITA, KS | -10.6 | 70.5 | KANSAS CITY/INTL., MO | -9.2 | 70.4 |
| DODGE CITY, KS | -10.4 | 68.3 | PARKERSBURG/WOOD CO., WV | -9.1 | 65.6 |
| RUSSELL, KS | -10.4 | 69.4 | LEXINGTON, KY | -9.1 | 66.6 |
| JOPLIN, MO | -10.3 | 69.3 | BELLEVEILLE/SCOTT AFB, IL | -9.1 | 69.3 |

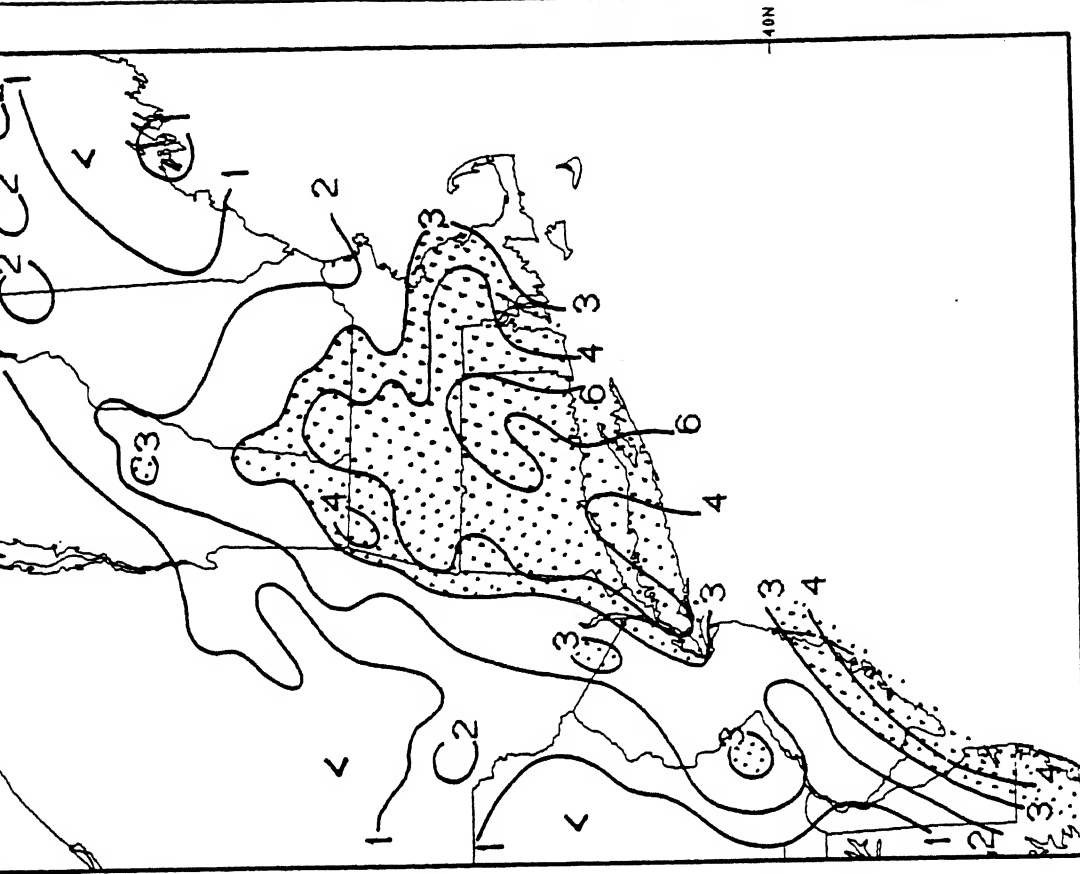
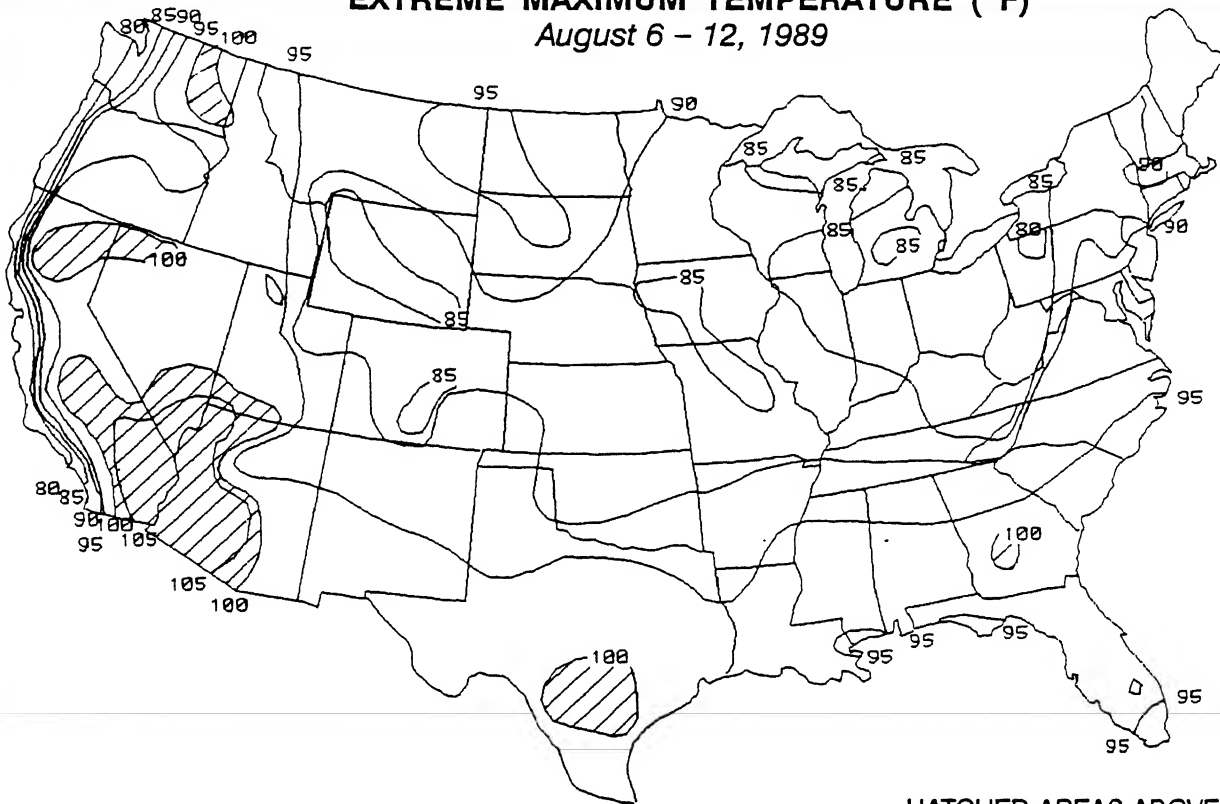


Figure 1. Total precipitation (inches) during August 6-12, 1989 based upon first-order synoptic, airways, and the River Forecast Centers stations. Isohyets are only drawn for 1, 2, 3, 4, and 6 inches, and stippled areas are more than 3 inches. A winter-like storm system slowly moved northward from Cape Hatteras, NC and spread heavy rains and gusty winds to the coasts of New England and the mid-Atlantic. Up to 10 inches of rain soaked portions of eastern Long Island, NY, and numerous reports of severe flooding occurred in the region.

EXTREME MAXIMUM TEMPERATURE (°F)

August 6 - 12, 1989

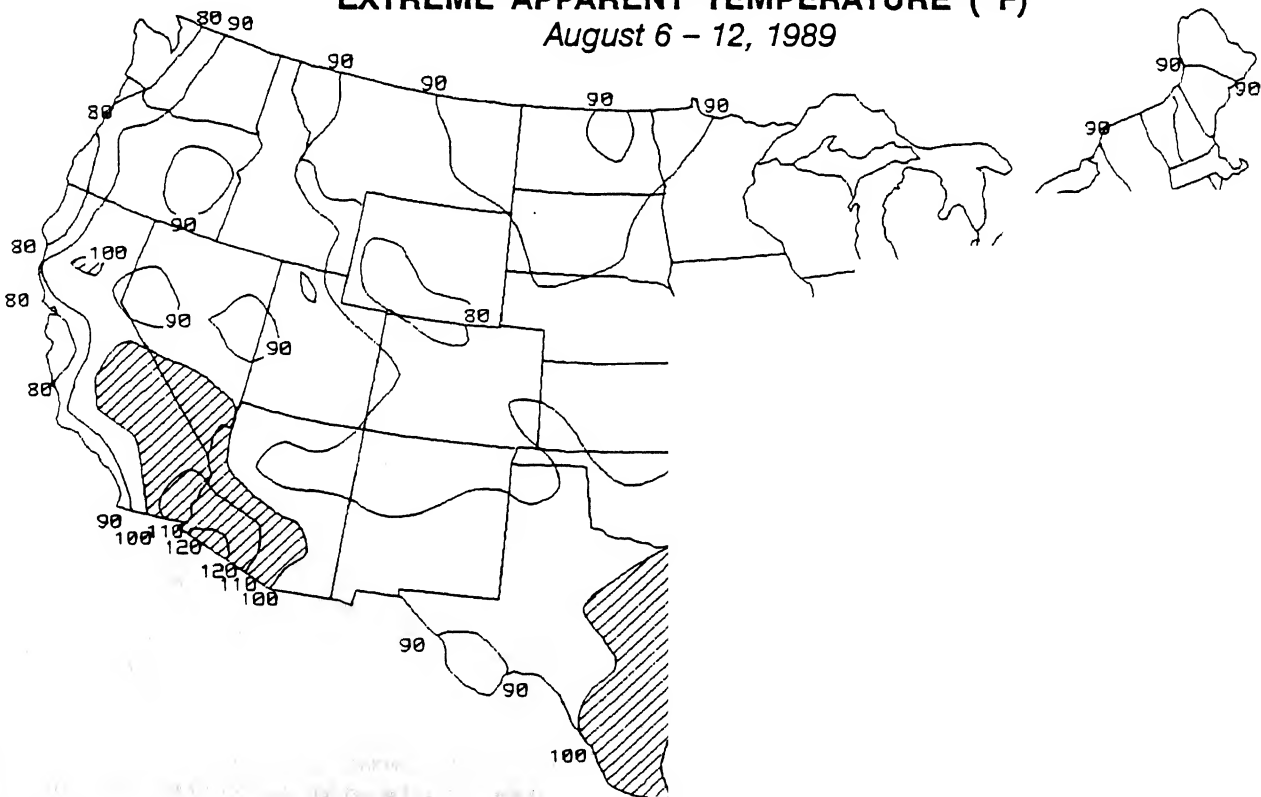


HATCHED AREAS ABOVE 100°F

Cooler air limited triple-digit readings to southern Texas, eastern Washington, central Georgia, northern California, and the desert Southwest (top). Heat and humidity combined to produce 100°F apparent temperatures in the desert Southwest and along the Gulf, southern, and middle Atlantic coasts (bottom).

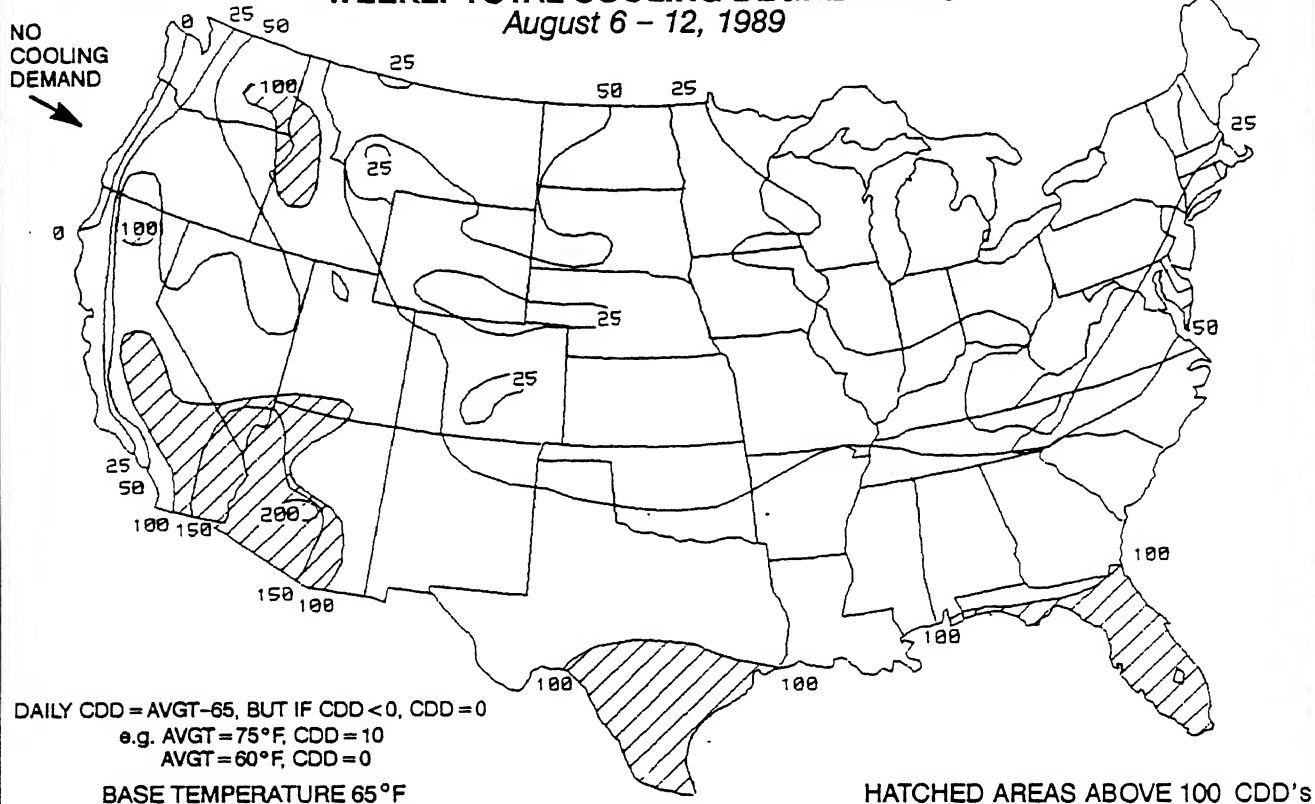
EXTREME APPARENT TEMPERATURE (°F)

August 6 - 12, 1989



WEEKLY TOTAL COOLING DEGREE DAYS

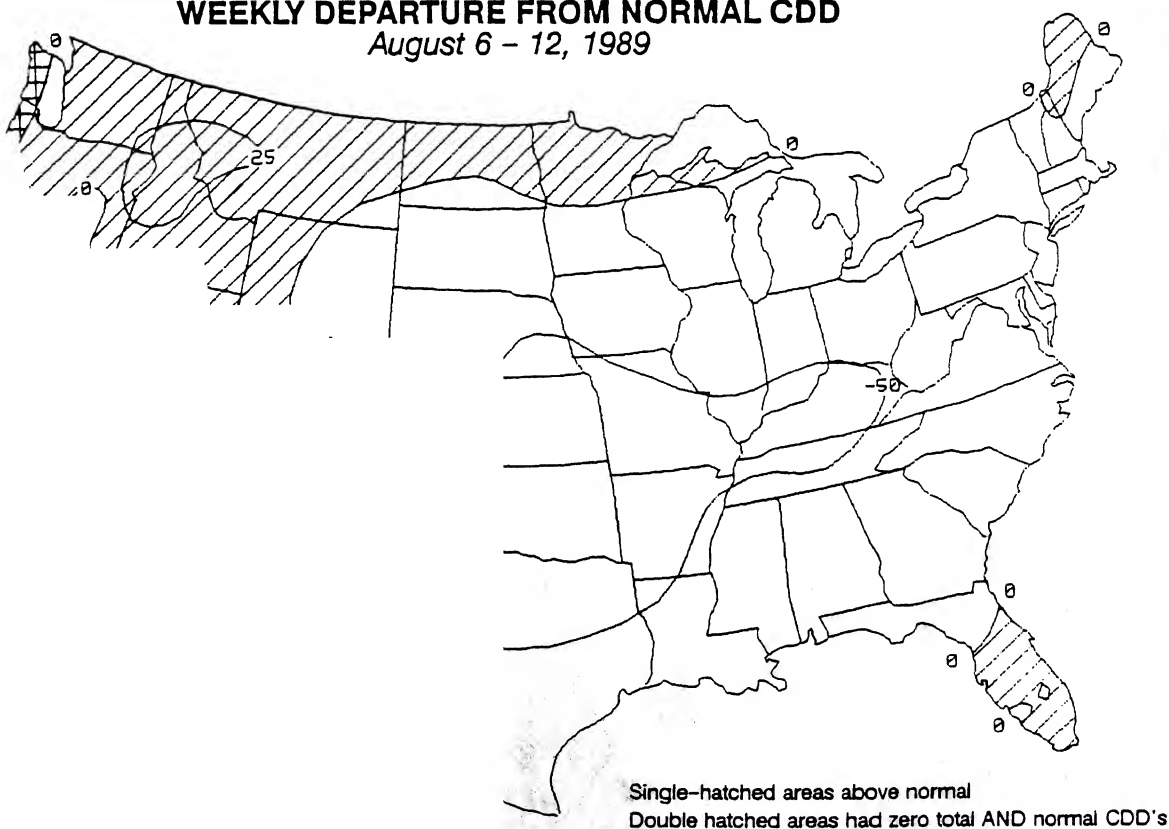
August 6 - 12, 1989



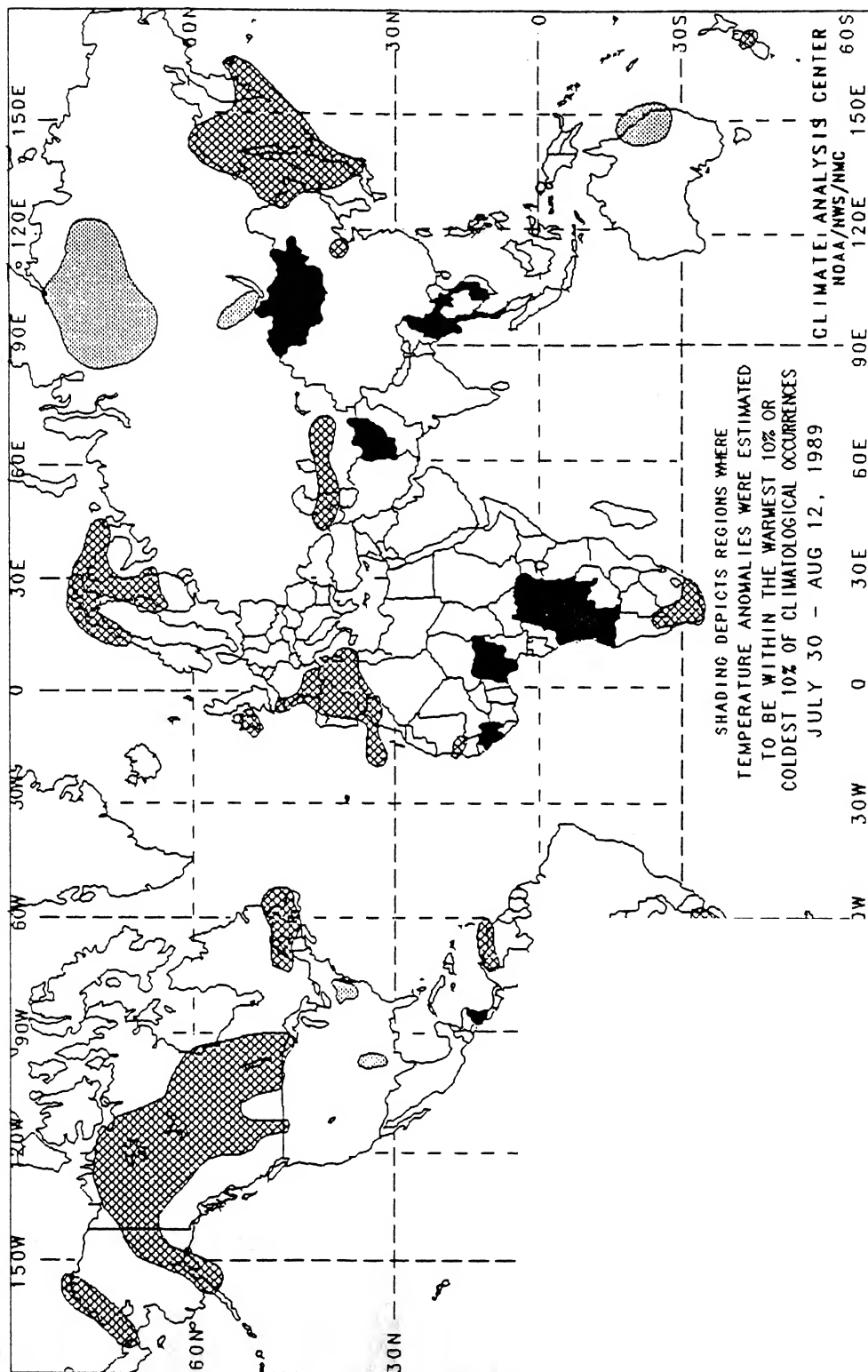
Weekly total CDD's surpassed 100 in the desert Southwest, Florida and southern Texas (top). Unseasonably cool weather kept air-conditioning usage below normal throughout much of the eastern and central U.S. while the West and northern Plains experienced above normal demand (bottom).

WEEKLY DEPARTURE FROM NORMAL CDD

August 6 - 12, 1989



2 WEEKS



Observations
from synoptic
data may not
represent the
true temperature

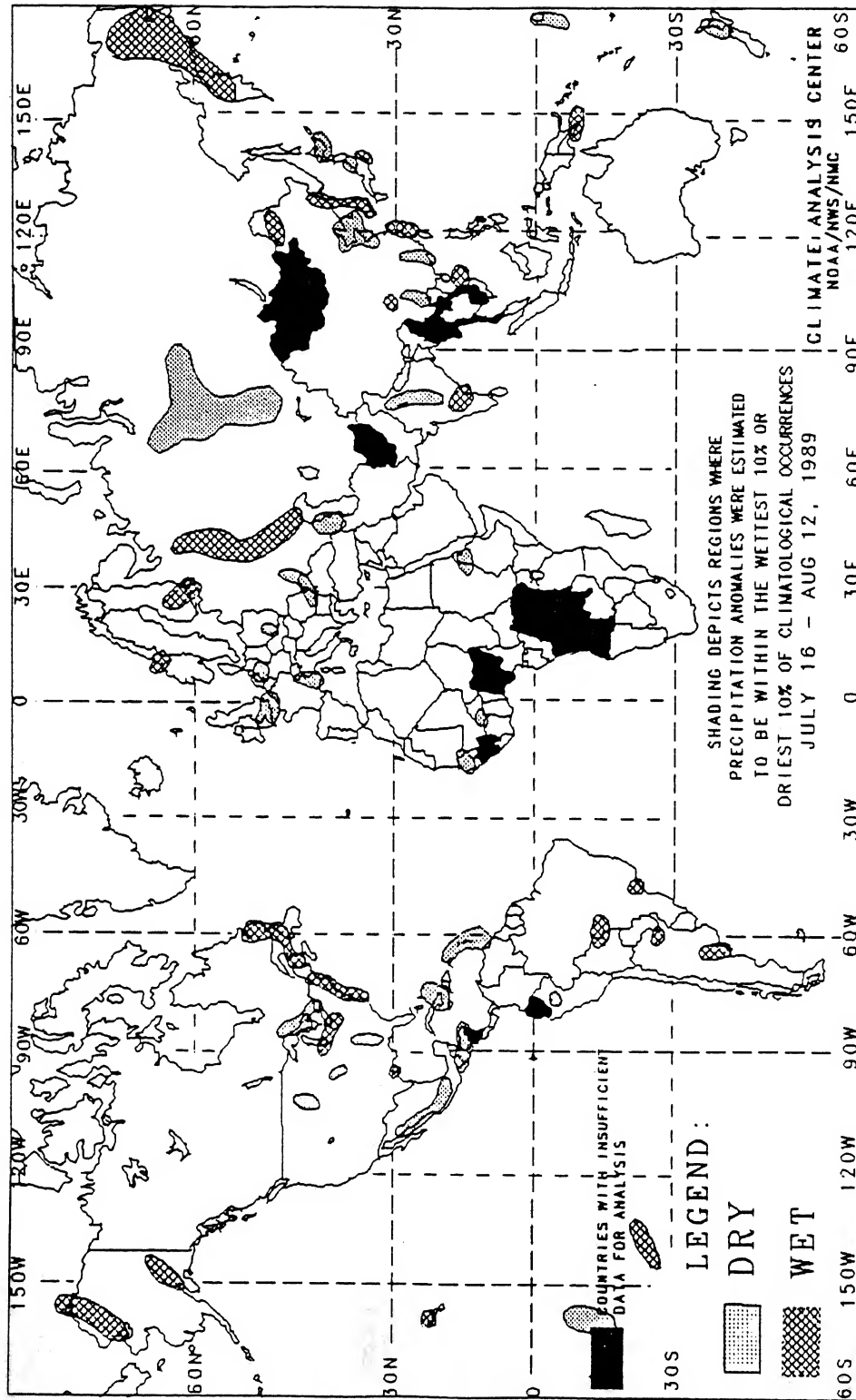
In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

Temperature

This chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL PRECIPITATION ANOMALIES

4 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

SPECIAL CLIMATE SUMMARY

CLIMATE ANALYSIS CENTER, NMC
NATIONAL WEATHER SERVICE, NOAA

1989 INDIAN MONSOON UPDATE

To date, the monsoon that generally ensues over most of the Indian subcontinent at this time of year has not deviated widely from normal expectations. Rainfall has fallen over all of India, Bangladesh, and most of Pakistan in recent weeks, and based upon historical averages, should continue over the entire region until the beginning of September. At that time, the monsoon usually begins a slow retreat that starts in Pakistan and advances south and eastward across India. A previous Special Climate Summary (see Weekly Climate Bulletin #89/28 dated July 15, 1989, pages 9-12) detailed the usual progression and retreat of the monsoon, and included a summarization of conditions at the time.

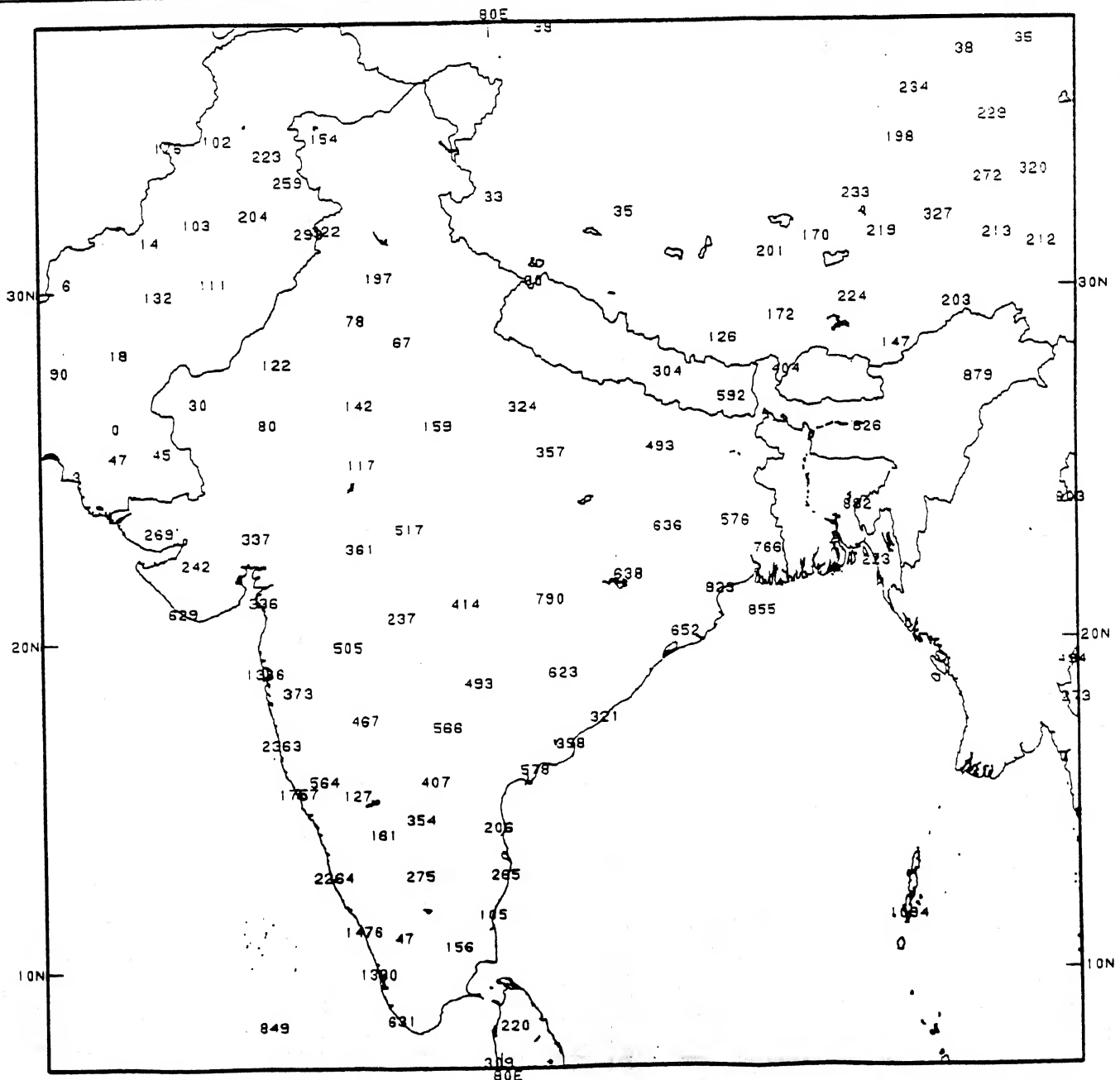


Figure 1. Total precipitation (mm) during June 1-August 12, 1989 (73 days). A station required 80% (58 days) or more of the days for inclusion. Rainfall generally increased from north to south and from west to east, except along the extremely wet southwestern coast and the normally drier interior portions of south-central India. There was insufficient data in Bangladesh and Burma. Monsoonal rainfall has been generous across southern and eastern India but subnormal in northwestern India.

Abundant precipitation has continued to fall over the southwestern coast where amounts vary from 1000 mm to 2300 mm (Figure 1). While sections of eastern India have received from 500 to 700 mm of rain, western portions have measured less than 100 mm. Northern India and Pakistan, which usually receive lesser amounts than other areas, received some significant rains in late July that likely caused flooding in the area. Floods due to intense heavy rains have also occurred in eastern India extending across Bangladesh northeastward into India's Assam state, and in south-central India, specifically in the states of Maharashtra and Andhra Pradesh.

Monsoonal rains have been close to normal in eastern and southwestern sections of India and northern Pakistan (see Figure 2). Portions of south-central India have received between 150% and 300% of normal rainfall since June 1. In contrast, north-central India has recorded from 1/4 to 1/2 of normal precipitation. The dry weather has also been accompanied by above normal temperatures (departures of $+1^{\circ}\text{C}$ to $+3^{\circ}\text{C}$) in northern and western India, additionally stressing crops and animals in these areas during recent weeks.

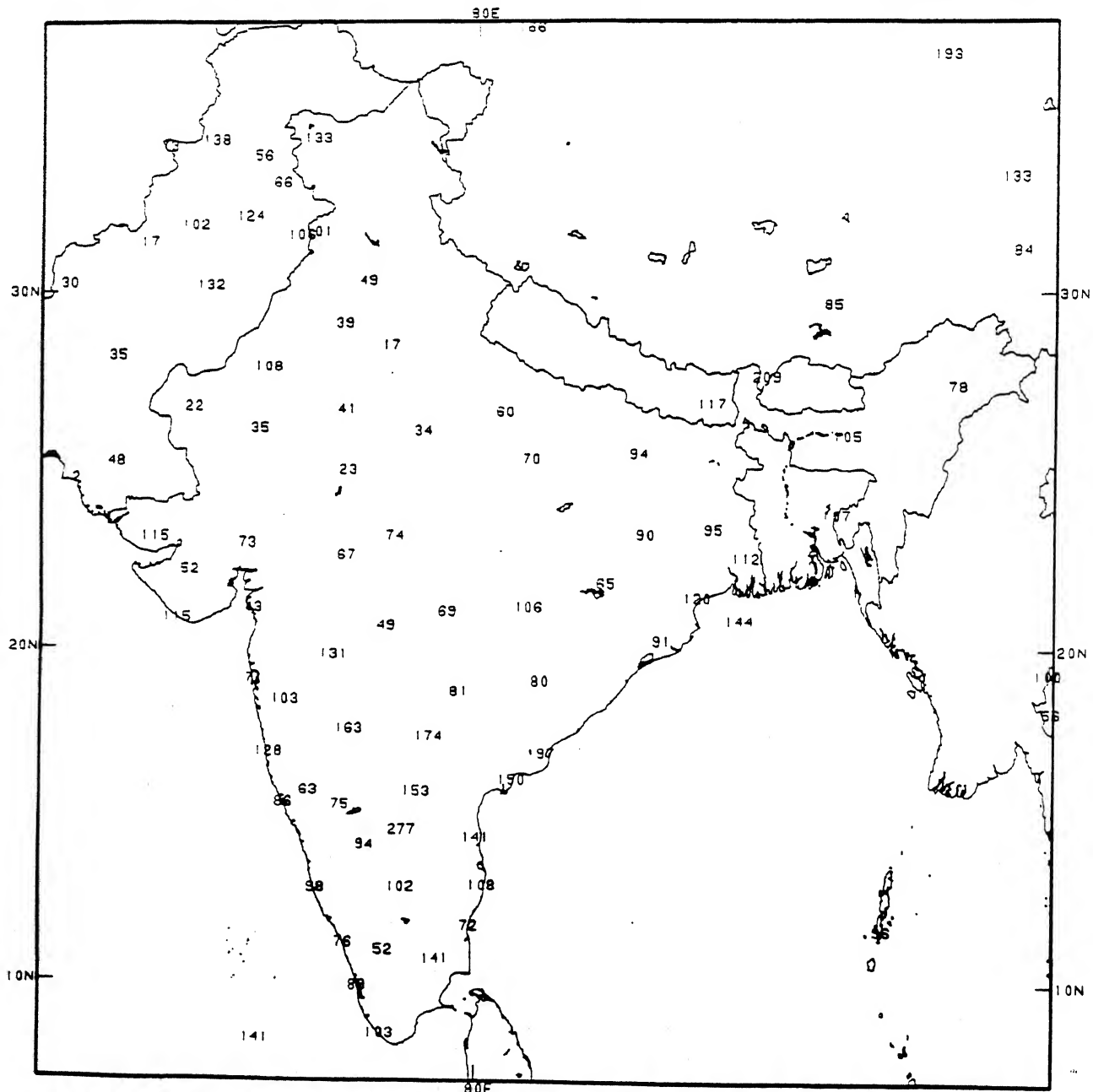


Figure 2. Percent of normal precipitation during June 1-August 12, 1989 (73 days). A station required 80% (58 days) or more of the days for inclusion. Near normal monsoonal rains have fallen over much of southern and eastern India, but areas with less than half the normal precipitation since June 1 existed in northern and western India.

SPECIAL CLIMATE SUMMARY

CLIMATE ANALYSIS CENTER, NMC

NATIONAL WEATHER SERVICE, NOAA

1989 AFRICAN SAHEL RAINY SEASON UPDATE

Since the last review of the African Sahel rainy season (see Weekly Climate Bulletin #89/28 dated July 15, 1989, pages 13-15), rainfall has generally increased during the past few weeks in most areas after relatively dry weather covered much of the region during the latter half of July. In the western half of the Sahel, after a slow start to the rainy season in northern Burkina Faso, southeastern Mali, and southwestern Niger, heavy rainfall during the past few weeks have brought the total precipitation accumulated since June 1 to near or above normal levels (Figure 1). Western Senegal and southern portions of Mauritania, after an extremely wet June and early July, experienced dryness during the latter half of July. Recent August rains, however, have improved short-term moisture conditions in the region. In Nigeria, incomplete meteorological data, satellite images, and press reports have indicated near normal seasonal moisture conditions. In contrast, a dry pocket has developed across western Burkina Faso and adjacent parts of Mali where rainfall continues to be deficient.

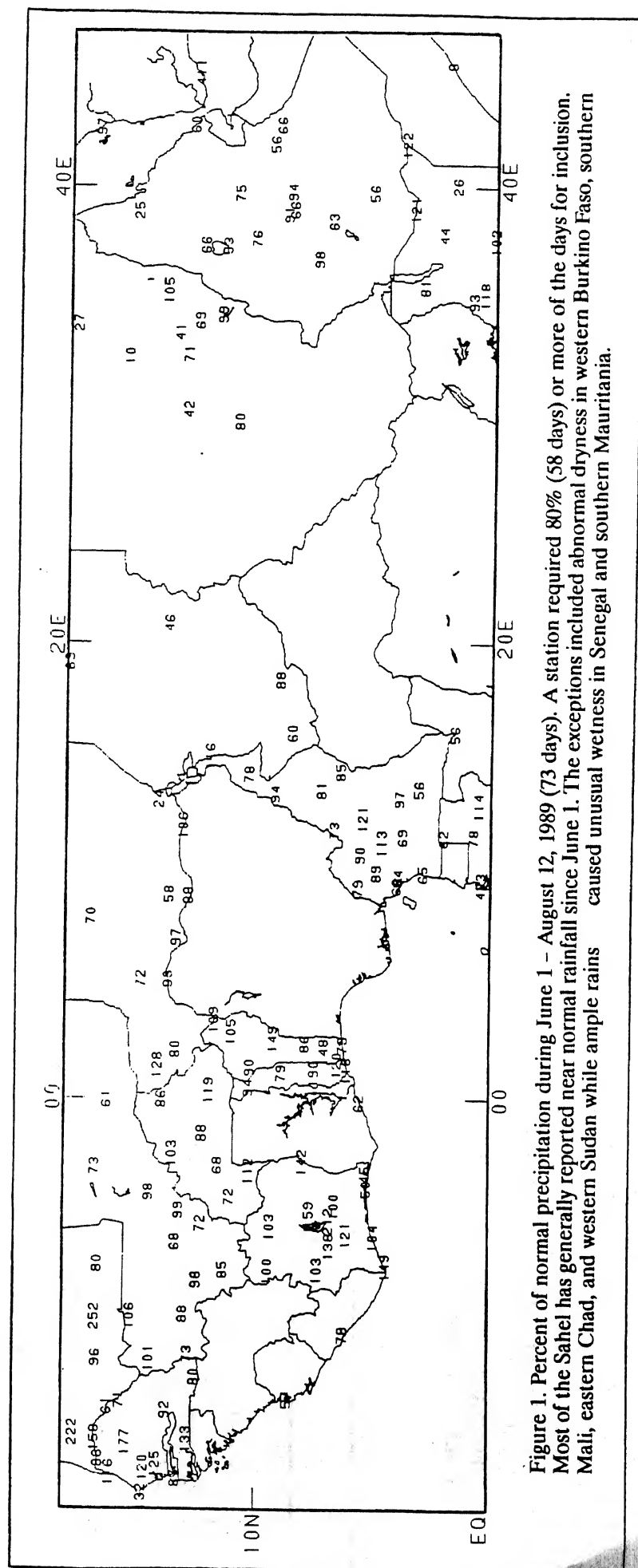


Figure 1. Percent of normal precipitation during June 1 - August 12, 1989 (73 days). A station required 80% (58 days) or more of the days for inclusion. Most of the Sahel has generally reported near normal rainfall since June 1. The exceptions included abnormal dryness in western Burkina Faso, southern Mali, eastern Chad, and western Sudan while ample rains caused unusual wetness in Senegal and southern Mauritania.

In the eastern half of the Sahel, Ethiopia, Sudan, and Chad have generally received near to below normal rainfall as totals have varied from 25 mm to 50 mm in the normally drier northern sections to over 400 mm in the usually wet central highlands and southern areas of Ethiopia (Figure 2). From incomplete meteorological data, satellite images, and outgoing longwave radiation data, severe dryness during July was indicated in portions of western Sudan and eastern Chad. Since August, however, abundant convective activity has occurred throughout the afflicted region and into parts of northern Ethiopia, the first significant precipitation in the latter region this year. With respect to temperatures, the extremely warm conditions that had been common in western and eastern Africa earlier this summer have eased in recent weeks as temperatures returned to more seasonable readings.

